PART TWO STUDIES

STATUS REPORT

October 24, 1983

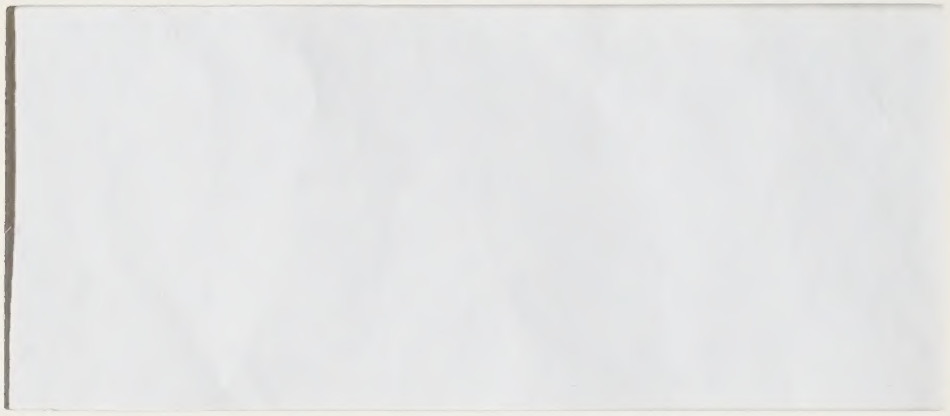
Complete.

Royal Commission on the
Ocean Ranger Marine Disaster

Canada

Commission Royale sur le
Désastre Marin de l'*Ocean Ranger*

Newfoundland/Terre-Neuve



Royal Commission on the
Ocean Ranger Marine Disaster

Canada

Commission Royale sur le
Désastre Marin de l'*Ocean Ranger*

Newfoundland/Terre-Neuve

PART TWO STUDIES

STATUS REPORT

October 24, 1983

Complete.

B. R. LeDrew
Director of Studies

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Edifice Fort William

PART TWO STUDIES

INTRODUCTION

The Royal Commission on the Ocean Ranger Marine Disaster has been given comprehensive Terms of Reference which are divided into two parts.

Part One calls for an extensive investigation into the loss of the drill rig, Ocean Ranger. This inquiry has been underway since the Commission was jointly established in March 1982 by the governments of Canada and Newfoundland and Labrador.

Part Two of the Commission's Terms of Reference call for it to "inquire into, report upon, and make recommendations with respect to" both the marine and drilling aspects of practices and procedures in respect of Eastern Canadian Offshore drilling operations and to a number of specific matters relating to drilling units operating offshore.

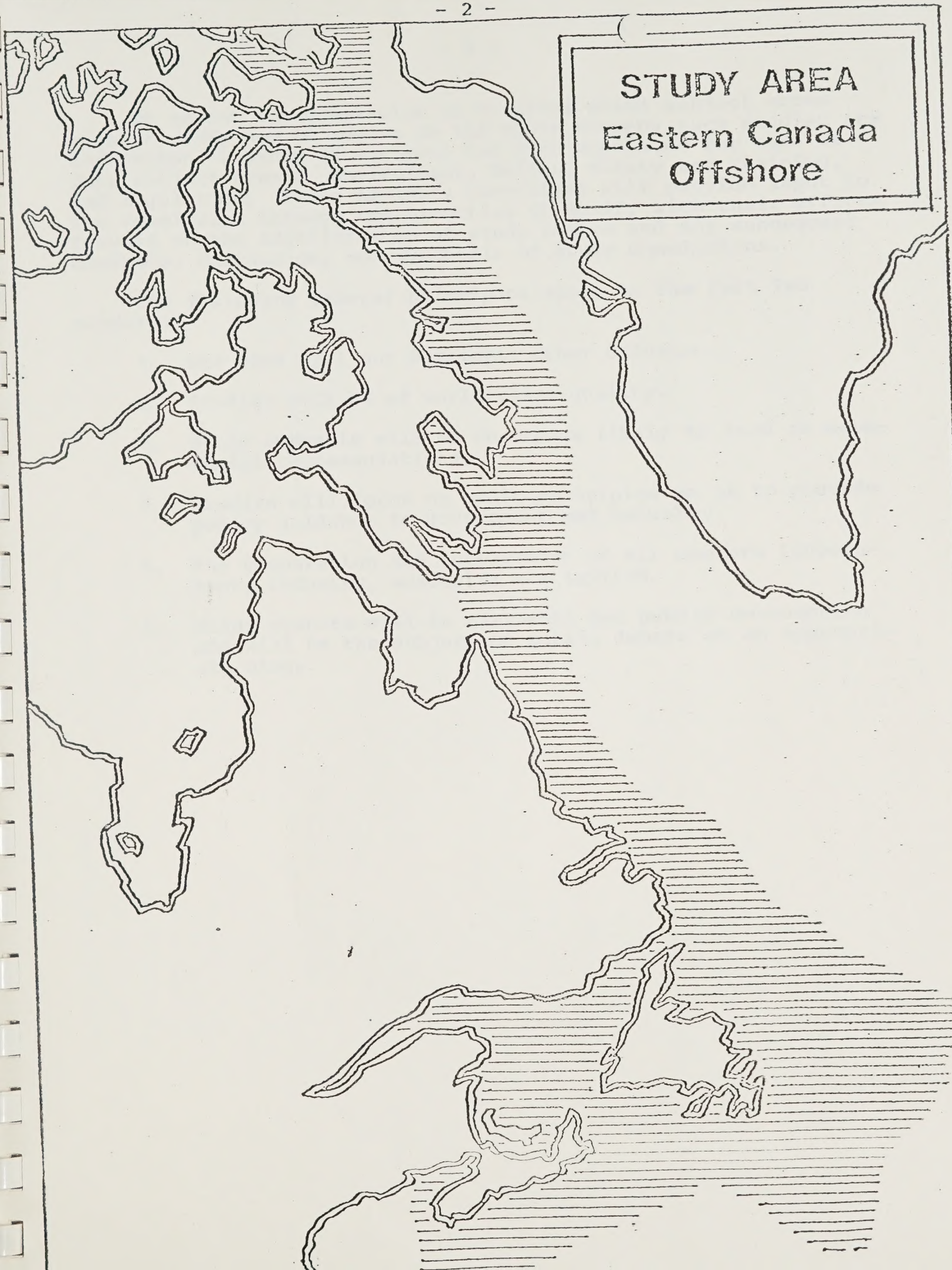
To address the Part Two Terms of Reference, the Commission is undertaking a study program the goal of which is:

TO IDENTIFY PRACTICAL MEANS OF IMPROVING THE SAFETY OF EASTERN CANADA OFFSHORE DRILLING OPERATIONS.

The study area is Eastern Canadian Offshore (see illustration) extending from the shoreline to the limits of jurisdictional claims. The area extends from the Canada-US boundary north to the limit of areas which will be serviced from East Coast ports and use marine drilling systems (approximately 75°N).

The subject of study is offshore exploration and delineation drilling operations, including service and supply (marine and air) activities

The issue is human safety. Property safety will be considered to the extent it affects human safety. Environmental safety will be addressed by a State of the Art Review.


STUDY AREA
Eastern Canada
Offshore

To assist the Commission in deciding which subject areas require study and to advise on the means whereby such studies are undertaken, a group of advisors has been appointed for each of four subject areas: Environment, Design, Safety and Training, and Regulation. These Advisory Committees will provide input to the Commission through the directing of staff, with their efforts focused on the identificaton of study topics and the subsequent analysis, discussion, and synthesis of study conclusions.

The following general principles apply to the Part Two studies:

1. The work will not duplicate other efforts.

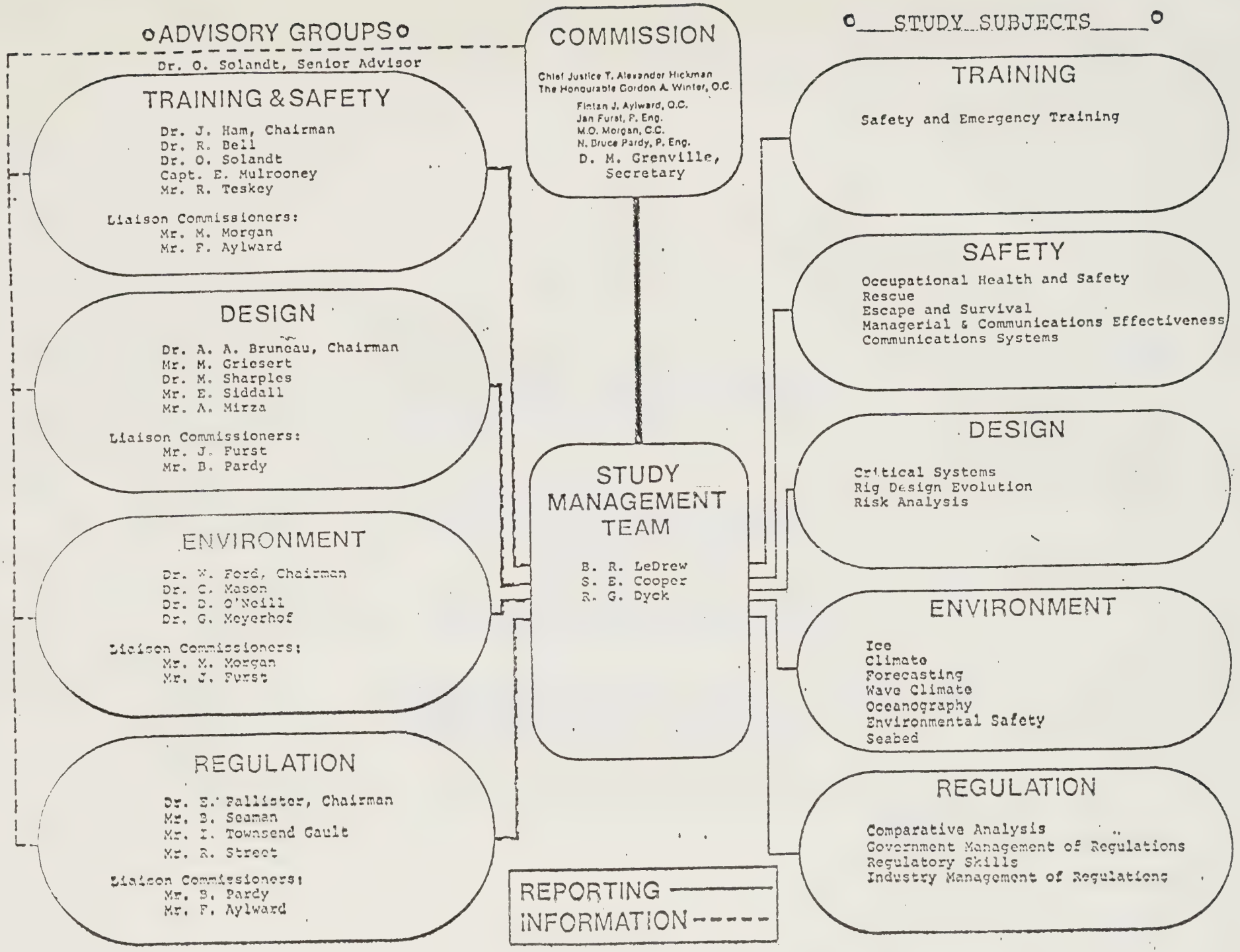
2. Studies will be of world-class quality.

3. Study emphasis will be on topics likely to lead to meaningful recommendations.

4. Studies will focus on basic principles so as to provide policy guidance to government and industry.

5. The cooperation and involvement of all sectors (government, industry, academia) are invited.

6. Study results will be available for public consumption and will be the subject of public debate at an appropriate stage.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Dr. R. Bell
Dr. O. Solandt
Capt. E. Mulrooney
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M.O. Morgan, C.C.
N. Bruce Pardy, P. Eng.
D. M. Grenville, Secretary
STUDY MANAGEMENT TEAM
B. R. LeDrew
S. E. Cooper
R. G. Dyck
STUDY SUBJECTS
TRAINING
Safety and Emergency Training
SAFETY
Occupational Health and Safety
Rescue
Escape and Survival
Managerial & Communications Effectiveness
Communications Systems
DESIGN
Critical Systems
Rig Design Evolution
Risk Analysis
ENVIRONMENT
Ice
Climate
Forecasting
Wave Climate
Oceanography
Environmental Safety
Seabed
REGULATION
Comparative Analysis
Government Management of Regulations
Regulatory Skills
Industry Management of Regulations
REPORTING
INFORMATION

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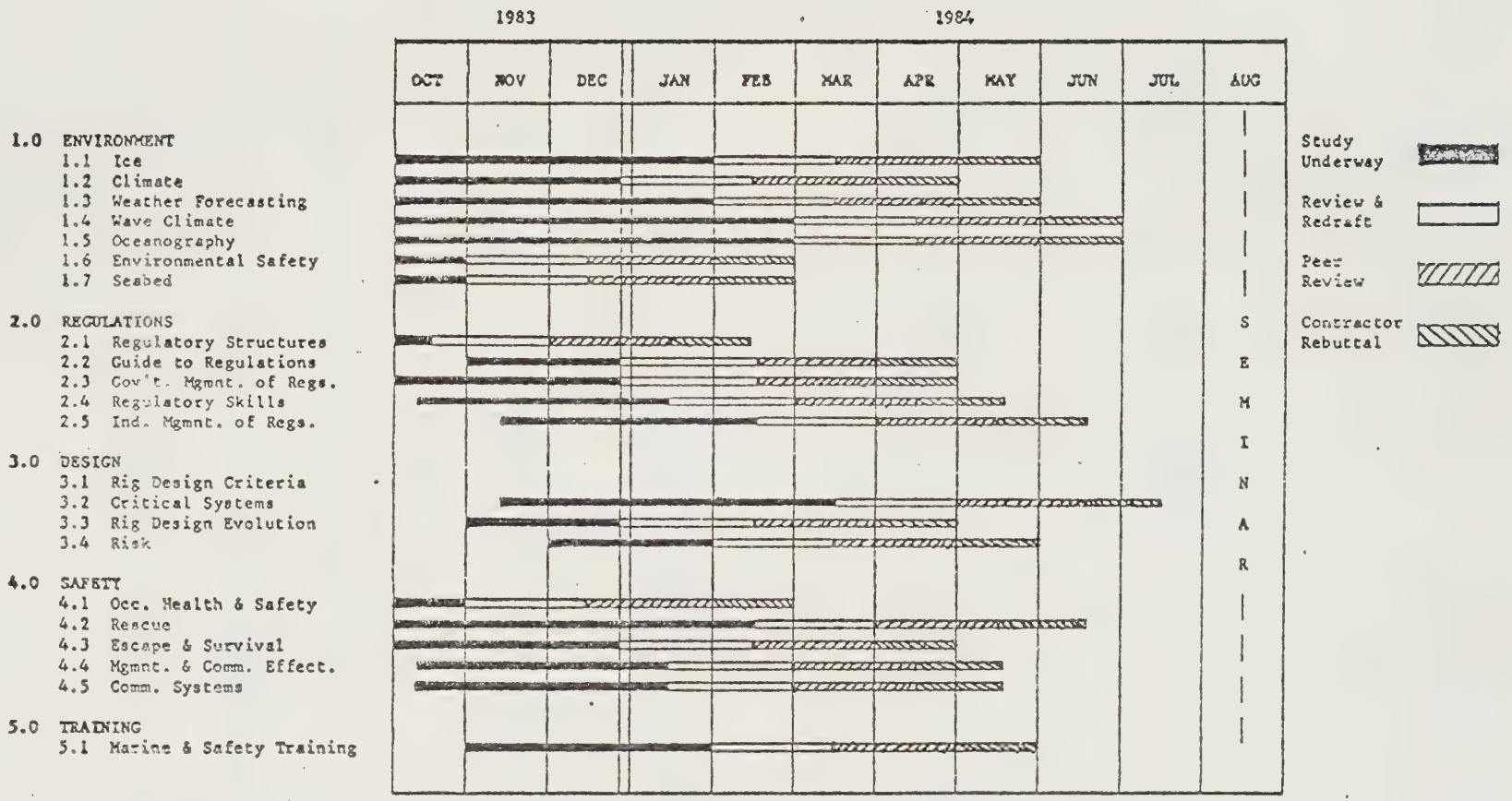
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AUG
1.0 ENVIRONMENT
1.1 Ice
1.2 Climate
1.3 Weather Forecasting
1.4 Wave Climate
1.5 Oceanography
1.6 Environmental Safety
1.7 Seabed
2.0 REGULATIONS
2.1 Regulatory Structures
2.2 Guide to Regulations
2.3 Gov't. Mgmnt. of Regs.
2.4 Regulatory Skills
2.5 Ind. Mgmnt. of Regs.
3.0 DESIGN
3.1 Rig Design Criteria
3.2 Critical Systems
3.3 Rig Design Evolution
3.4 Risk
4.0 SAFETY
4.1 Occ. Health & Safety
4.2 Rescue
4.3 Escape & Survival
4.4 Mgmnt. & Comm. Effect.
4.5 Comm. Systems
5.0 TRAINING
5.1 Marine & Safety Training
SEMINAR
Study Underway
Review & Redraft
Peer Review
Contractor Rebuttal

1.0 ENVIRONMENT

This study area will address the physical environment conditions within which offshore drilling operations take place. Emphasis will be placed on severe and limiting conditions and their detection or prediction.

STUDY TOPIC: 1.1 - Ice

CONTRACTOR: Nordco Limited, St. John's, NF
Contact: Dr. Roger Stacey

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: The Phase I report has been received and will be reviewed over the next two weeks.

STATEMENT OF WORK:

Study Objectives

To critically assess the adequacy of available information on ice needed as input to design criteria, operating constraints, and emergency response capability for Eastern Canada Offshore exploratory drilling operations.

To critically assess the adequacy of ice hazard detection systems required for the safe conduct of Eastern Canada Offshore drilling operations.

Scope

a. Ice - includes ice in all its forms--sea ice, icebergs, freezing spray, and ice accretion.

b. Design Criteria - refers to mobile offshore drilling units (dynamically positioned drillships, semi-submersibles, and jack-up units).

c. Operating Constraints - includes conditions for:
- rig - transfer mode
  - drilling mode
  - survival mode
- vessel - standby
  - transport
  - loading, offloading
- helicopter - take-off
  - landing
  - travel

d. Emergency Response Capability - refers to equipment and procedures used for personnel evacuation, survival, location, and recovery and includes Government Search and Rescue.

e. Ice Hazard Detection Systems - refers to equipment (hardware and software), personnel, and procedures used to detect and forecast hazards presented by ice and will include the measurement/estimation of driving forces (wind, currents).

Task Description

1. Stage one - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

A general description of the Eastern Canada Offshore ice environment is to be provided by the contractor with particular emphasis on historical records. Design criteria for ice phenomena will be identified.

The contractor will undertake a scope review and make recommendations on the Stage Two work scope and schedule.

2. Stage Two - State of the Art Assessement

a. Describe methods used to gather ice information.
b. Describe the extent and duration of the existing database.
c. Describe methods used to extrapolate or expand the database.
d. Compare the quantity and quality of data available against design requirements and in relation to data available for other identified areas or other environmental factors.
e. Assess the adequacy of present data collected in terms of methods and equipment, analysis techniques, data reporting (likelihood of obtaining inaccurate information), and geographic and seasonal coverage.
f. Assess the effect of forces created by ice on rig design/on drilling operations/and on emergency response.
g. Define the limitations and capabilities of present ice hazard detection systems (time/space, accuracy/precision).
h. Describe and assess potential systems including those under development or available but not applied to ice.
i. Consider the effects (synergistic) of combinations of ice and other hazards.
j. Consider methods of presentation of ice information as input to rig design requirements.
k. Conclusion/Recommendations - Describe the adequacy of the present database and methods of gathering data. Discuss the adequacy of present systems to assure safety of the operation.

l. Recommend steps to be taken to improve safety of operations by improved utilization of ice information.
m. Identify specific study needs.

STUDY TOPIC: 1.2 - Climate

CONTRACTOR: Canada Climate Centre, Downsview, ON
Contact: Mr. Bruce Findlay

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: The final report is due December 15, 1983.

STATEMENT OF WORK:

Study Objective

To critically assess the adequacy of climate information needed as input to design, operations, and emergency response capability for Eastern Canada Offshore exploratory drilling operations.

Scope

Climate information refers to environmental phenomena such as:
- wind (speed/direction)
- air temperature
- precipitation
- freezing spray
- ceiling/visibility
- cyclones/storm tracks

It includes the description of these phenomena according to accepted methods (eq. probable maximum wind speed, three-second gust speed with an average recurrence period of 50 years, etc.).

Design refers to mobile offshore drilling units (dynamically positioned drill ships, semi-submersibles, and jack-up units).

Operation refers to:
- rig - transit mode
  drilling mode
  survival mode
- vessel - transit
  standby
  loading/offloading
- helicopter - take off/landing
  travel
- personnel - exposure

Emergency response capability refers to equipment and procedures for personnel evacuation, survival, location, and recovery and includes government Search and Rescue.

Task Description

1. Stage One - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

A general description of the Eastern Canada Offshore climate will be provided by the contractor with particular emphasis on histerical records. Phenomena of importance to rig design will be identified and emphasized.

A review of terms of reference will be undertaken and recommendations provided for Stage Two work scope and shedule.

2. Stage Two - State of the Art Assessment

a. Describe the methods used to gather climate information.

b. Describe the extent and duration of the existing data base.

c. Describe the methods used to extrapolate from limited data and (where appropriate) to apply data gathered from other areas.

d. Compare the quantity and quality of data available against design requirements and in relation to data available for other areas or other environmental factors.

e. Assess the adequacy of present data collected in terms of:

- methods and equipment
- analysis techniques
- data reporting (i.e. the likelihood of obtaining inaccurate information)
- geographic and seasonal coverage

f. Critically analyse the adequacy of the present data base and methods of gathering data.

g. Assess the effect on design/operating/emergency criteria of combinations of factors.

h. Make recommendations on improving safety of offshore exploratory drilling operations by improved utilization of climate information.

i. Identify further study needs.

STUDY TOPIC: 1.3 - Weather Forecasting

CONTRACTOR: Seaconsult Limited, St. John's, NF
Contact: Dr. Ken Harry

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: Stage I report has been submittedjand will be reviewed over the next two weeks.

STATEMENT OF WORK:

Study Objective

To critically assess the adequacy of observation and weather prediction services provided in support of Eastern Canada Offshore drilling operations.

Study Scope

Weather prediction services - refers to equipment, personnel, and procedures used to detect and forecast hazards presented by weather conditions.

Weather - includes wind, air temperature, precipitation (liquid, frozen and freezing), fog, visibility/ceiling, atmospheric pressure, and related factors.

Task Description

1. Stage One - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evalution of the extent to which other efforts are addressing the study topic.

The various activities which comprise exploratory drilling operations and which are sensitive to weather conditions are to be identified and a description provided of their report/forecasting requirements.

The present weather observation and prediction systems and observational services will be described and evaluated.

A review of terms of reference will be undertaken and recommendations provided for Stage Two work scope and schedule.

2. Stage Two - State of the Art Assessemnt

a. Identify the limitations of time/space and accuracy/precision of present systems. Describe the time it takes to obtain and translate data, prepare forecasts, and communicate these to the user. Describe the area covered and lead time provided by forecasts.

Assess the accuracy and precision of predictions in terms of consistency, reliability, and variability, particularly in relation to critical meteorological conditions.

b. Assess the adequacy of present forecast services in relation to available technologies/capabilities and in relation to operator requirements.

c. Assess any potential developments which could improve forecasting.

d. Describe measures to improve safety of offshore operations by improved applications or methods of meteorological observation and prediction.

e. Identify specific study needs.

STUDY TOPIC: 1.4 - Wave Climate

CONTRACTOR: Marine Environmental Data Services Branch
Contact: Dr. J.R. Wilson

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: Phase I report has been submitted and will be reviewed over the next two weeks.

STATEMENT OF WORK:

Study Objective

To critically assess the adequacy of wave climate information needed as input to design criteria, operating constraints, and emergency response capability for Eastern Canada offshore exploratory drilling operations.

To critically assess the adequacy of sea state measurement, observation, and prediction services provided in support of Eastern Canada offshore drilling operations.

Study Scope

a. Wave Climate - refers to sea surface phenomena and is described as height, period, and direction. It includes the description of these phenomena according to accepted methods.

b. Design Criteria - refers to mobile offshore drilling units (dynamically positioned drillships, semi-submersibles, and jack-up units). It will include information in the format required by designers and regulatory agencies, and shall include 50 year design wave, wave groupings, probable distribution of wave encounters, wave energy spectra (one dimensional and directional).

c. Operating Constraints - includes conditions for:

- rig - transfer mode
  - drilling mode
  - survival mode
- vessel - standby
  - transport
  - loading, offloading
- helicopter - take-off
  - landing
  - travel

d. Emergency Response Capability - refers to equipment and procedures used for personnel evacuation, survival, location, and recovery and includes Government Search and Rescue.

e. Sea State Measurement, Observation, and Prediction Services - refers to equipment (hardware and software), personnel, and procedures used to measure (observe) and forecast hazards presented by waves and will include the measurement/ estimation of driving forces (wind, currents).

Task Description

1. Stage One - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

A general description of the Eastern Canada Offshore wave climate is to be provided by the contractor with particular emphasis on historical records. Phenomena of importance to rig design and offshore operations will be identified and emphasized.

The contractor will undertake a scope review and make recommendations on the Stage Two work scope and schedule.

2. Stage Two - State of the Art Assessment

a. Describe methods used to gather wave information.
b. Describe the extent and duration of the existing database.
c. Describe methods used to extrapolate or expand the database.
d. Compare the quantity and quality of data available against design requirements and in relation to data available for other identified areas or other environmental factors.
e. Assess the adequacy of present data collected in terms of methods and equipment, analysis techniques, data reporting (likelihood of obtaining inaccurate information), and geographic and seasonal coverage.
f. Assess the effect of forces created by waves on rig design/on drilling operations/and on emergency response.
g. Define the limitations and capabilities of present sea state prediction systems (time/space, accuracy/precision).
h. Describe and assess potential systems.
i. Consider the effects (synergistic) of combinations of waves and other hazards.
j. Consider methods of presentation of sea state information as input to rig design requirements.
k. Critically analyse the adequacy of thepresent database and methods of gathering data. Discuss the adequacy of present systems to assure safety of the operation.
l. Recommend steps to be taken to improve safety of operations by improved utilization of wave climate information.
m. Identify specific study needs.

STUDY TOPIC: 1.5 - Oceanography

CONTRACTOR: Seaconsult Limited, St. John's, NF
Contact: L.W. Davidson

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: The Stage I report is due November 15, 1983.

STATEMENT OF WORK:

Study Objective

To critically assess the adequacy of available oceanographic information needed as input to design criteria, operating constraints, and emergency response capability for Eastern Canada offshore exploratory drilling operations.

Study Scope

a. Oceanographic information includes physical oceanographic phenomena such as:

- water currents
- wave-current interactions
- shallow water phenomena (refraction/reflection)
- internal waves
- tidal phenomena
- water depth
- temperature/salinity

but does not include wave climate. Also included are biofouling phenomena. The description of these phenomena shall be provided according to accepted methods.

b. Design Criteria - refers to mobile offshore drilling units (dynamically positioned drillships, semi-submersibles, and jack-up units).

c. Operating Constraints - includes conditions for:

- rig - transfer mode
  - drilling mode
  - survival mode
- vessel - standby
  - transport
  - loading, offloading
- helicopter - take-off
  - landing
  - travel

d. Emergency Response Capability - refers to equipment and procedures used for personnel evacuation, survival, location, and recovery and includes Government Search and Rescue.

Task Description

1. Stage One - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

A general description of the Eastern Canada Offshore oceanography is to be provided by the contractor with particular emphasis on historical records. Design criteria related to oceanographic phenomena will be identified.

The contractor will undertake a scope review and make recommendations on the Stage Two work scope and schedule.

2. Stage Two - State of the Art Assessment

a. Describe methods used to gather oceanographic information.
b. Describe the extent and duration of the existing database.
c. Describe methods used to extrapolate or expand the database.
d. Compare the quantity and quality of data available against design requirements and in relation to data available for other identified areas or other environmental factors.
e. Assess the adequacy of present data collected in terms of methods and equipment, analysis techniques, data reporting (likelihood of obtaining inaccurate information), and geographic and seasonal coverage.
f. Assess the effect of forces created by oceanographic phenomena on rig design/on drilling operations/and on emergency response.
g. Consider the effects (synergistic) of combinations of oceanographic and other hazards.
h. Consider methods of presentation of oceanographic information as input to rig design requirements.
i. Conclusion/Recommendations - Describe the adequacy of the present database and methods of gathering data. Discuss the adequacy of present systems to assure safety of the operation.
j. Recommend steps to be taken to improve safety of operations by improved utilization of oceanographic information.
k. Identify specific study needs.

STUDY TOPIC: 1.6 - Environmental Safety

CONTRACTOR: Fisheries & Oceans Canada and Environment Canada
Contacts: Dr. C.J. Edmunds
R.J. Wiseman

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: State of the Art Review paper will be completed November 1, 1983.

STATEMENT OF WORK:

Study Objective

To assess the environmental threat posed by Eastern Canada offshore exploratory drilling operations.

Study Scope

The state of the art assessment will be done with respect to Eastern Canada offshore exploratory (and delineation) drilling operations (including marine and air transport support).

As identified in the attached review, the study will address the impact created by normal (planned) operations, as well as unplanned (catastrophic) events.

The practicability and effectiveness of (oil spill) countermeasures (containment, control, dispersal, recovery, and disposal) will be considered in light of physical conditions (ice, sea state, distance) which can be expected to occur. Fate and effects of pollutants (especially hydrocarbons) will be identified and discussed in relation to fish stocks, fishing grounds, fishing gear, and other utilized resources (seals and seabirds).

Socioeconomic issues, such as compensation policy, sector competition for trained personnel, and "boom-bust" cycles, will not be considered.

Task Description

1. A review of available literature and ongoing research and development activities will be undertaken to identify the extent to which the study topic has been or is being addressed.

2. The organizations, institutions, and individuals conducting relevant research and development will be identified and the nature and direction of their work briefly described.

3. The significant potential sources of pollution (environmental impacts) will be identified, both from normal (planned) as well as catastrophic (unplanned) events.

4. The known fate and effects of pollutants, especially hydrocarbons, will be described. The absorptive capacity of the aquatic environment will be discussed.

5. An overview will be provided of countermeasures techniques, with a commentary on their practicability and effectiveness (including potential environmental impacts). Promising research and development directions will be discussed.

6. A concluding discussion will endeavor to place in perspective the environmental threat posed by Eastern Canada offshore hydrocarbon exploratory drilling operations.

STUDY TOPIC: 1.7 - Seabed

CONTRACTOR: Jacques, Whitford & Associates Ltd.
Contact: W.R. Sutherland

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: The delivery date for the final report is October 31, 1983.

STATEMENT OF WORK:

Study Objective

To critically assess the adequacy of available seabed information needed as input to design criteria and operating constraints for Eastern Canada offshore exploratory drilling operations (drillships, semisubmersibles, and jack-ups).

Study Scope

a. Seabed - refers to the ocean floor to the sub-bottom depth required for adequate mooring and foundation systems;

b. Seabed information - means the nature and depth of seabedmaterial and their static and dynamic properties and seismic phenomena;

c. Design Criteria - refers to mobile offshore drilling equipment in contact with the seabed and includes,specifically, jack-up foundations and semisubmersible mooring systems and any wellhead/seabed interface.

d. Operating Contraints - refers to the analysis of drilling and environmental forces for the period and location of operation and the stability of offshore units under applied loading.

Task Description

1. Stage One - Scope Review

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

A general description of the Eastern Canada Offshore seabed is to be provided by the contractor with particular emphasis on historical records. Design criteria related to seabed analysis will be identified.

The contractor will undertake a scope review and make recommendations on the Stage Two work scope and schedule.

2. Stage Two - State of the Art Assessment

Evaluate the adequacy and availability of seabed information at this time and subject to recommendations made following Stage One, the following are seen as needing to be addressed in detail:

a. the existing sources of information;
b. the methods and format used to extract the information;
c. the methods of data analysis;
d. the means by which the information is extrapolated or conditions are simulated;
e. the relationship of seabed material and conditions to design criteria;
f. the dynamics of seabed materials and conditions including seismic phenomena;
g. the adequacy of procedures and systems for monitoring seabed phenomena during operations.

As a conclusion, strengths and weaknesses of seabed information provision and use, as it affects operation safety, should be highlighted; and specific areas of concern that require further study should be indentified.

2.0 REGULATIONS

This study area will address the manner in which offshore drilling operations are controlled by rules, regulations, and guidelines and their relationship to safety. While the emphasis will be on government control, the role of industry will also be considered.

STUDY TOPIC:	2.1 - Regulatory Structures
CONTRACTOR:	Dalhousie Ocean Studies Program Contact: Mr. N. Letalik
COMMISSION STUDY TEAM REPRESENTATIVE:	R.C. Dyck Phone: (709) 772-4319
STATUS:	A draft final report has been submitted and will be subject to peer review over the next four weeks.

STATEMENT OF WORK:

Objective

To examine the structure, approach, and mechanisms of promulgated safety regulations governing the design, construction, and operation of offshore installations in a selection of countries actively involved in offshore exploration development and production.

To provide a concise, comparative summary of national approaches to offshore safety regulation in Norway, the USA, Canada, and the UK.

STUDY TOPIC: 2.2 - Guide to Offshore Drilling Regulations

CONTRACTOR:

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A study of this topic has recently been completed for the Eastcoast Petroleum Operators Association. A copy has been requested.

STATEMENT OF WORK:

Study Objective

To explain the substance and intent of (federal and provincial) government regulations pertaining to the safe conduct of Eastern Canada offshore exploratory drilling operations.

Scope

The exercise will consist of a review of:

a. The Canada Oil and Gas Drilling Regulations
b. The Newfoundland and Labrador Petroleum Drilling Regulations
c. The Canada Shipping Act

The exercise will produce a condensed version of the outlined regulations which combines the regulations into a single document utilizing a minimum of legal and technical verbage. The purpose of each area within the regulations will be determined.

Task Description

The contractor will examine the regulations and proceed in the following manner:

1. Edit the regulations eliminating those portions of the regulations which do not apply specifically to the safety aspects of Eastern Canada offshore exploratory drilling (ie. portions of the regulations pertaining to rig design, onshore wells, electrical standards, reporting of well information, collection of samples and fluids, etc.).

2. The regulations will be grouped into broad areas such as safety and training, safety equipment, environment, well design, well control, etc.

3. The regulations within each of these broad areas will be condensed and the legal and technical jargon removed to the extent that is possible.

4. The contractor will provide a description of the problem/problems addressed by each area within the regulations.

STUDY TOPIC: 2.3 - Government Management of Regulations

CONTRACTOR: National Petroleum and Marine Consultants Limited, St. John's, NF
Contact: Dr. W. Russell

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A draft final report is expected January 31, 1984.

STATEMENT OF WORK:

Study Objective

To assess critically the organization and management structure whereby governments regulate the safety of Eastern Canada offshore drilling operations.

Scope

1. The study will include the present organization and management structure and will address any significant changes which have been made to this structure in the past year as well as any firm plans for changes in the immediate future.

2. This study will address the federal and provincial (Nova Scotia and Newfoundland) government organizations.

3. It will include those agencies responsible for administering legislation pertinent to safety of offshore exploration activities, including marine, drilling, and (air and sea) support functions.

4. Safety functions will include occupational health and safety, equipment safety, Worker's Compensation, labour codes, emeregency equipment, and training.

5. The assigned responsiblities of the various agencies will be described. The administrative arrangements to assign responsibilities and to coordinate activities will be described as they relate to: the development of regulations; liaison with industry; inspection, monitoring, and enforcement of regulations; and resolution of interagency conflicts.

6. The actual functioning of safety management will be described with emphasis on the de facto exercise of responsibilities.

7. A critical assessment of the management structure of each government will be undertaken.

Task Description

1. The management structure and current (effective) organization charts of the primary federal and provincial regulatory agencies will be outlined, and the overall responsibilities of these organizaton units as they relate to safety of Eastern Canada offshore exploration will be described. The primary federal and provincial regulatory agencies are agencies which have been designated, by legislation, as having an overall responsibility for Eastern Canada offshore exploration safety.

2. Agencies which have responsibilities related to specific facets of Eastern Canada offshore exploration safety, by virtue of provincial or federal legislation, will be identified. The management and organization structure will be described for that part of the organization which relates to safety of Eastern Canada exploration activity. Specific descriptions will be provided of the coordination or liaison mechanism to deal with the primary agencies.

3. Liaison mechanisms, advisory committees, boards, and other structures employed to provide an advisory or management role will be identified. The responsibilities and membership of these bodies will be identified.

4. The administrative arrangements currently in place to assign responsibilities and coordinate activities will be described. Special emphasis will be placed upon the arrangements in place to:

- develop/modify regulations
- inspect equipment
- monitor ongoing operations
- enforce regulations
- provide liaison with industry
- resolve interagency conflicts
- approve submissions such as contingency plans, drilling, applications, etc.
- approve operations/equipment not currently addressed by the regulations.

5. The actual functioning of safety management will be described with emphasis placed upon the actual performance of organizational units relative to their areas of responsibility.

6. A critical assessment of the safety management structure in the Nova Scotia sector, the Newfoundland and Labrador sector, and the northern sector (north of 60°N) will be undertaken. Areas of overlap, areas where no clear responsibility exists, and other problem areas will be identified; and conclusions will be drawn as to the effectiveness of the management structure.

7. Recommendations will be made as to how the safety mangement structure can be improved in the Nova Scotia sector, the Newfoundland and Labrador sector, and the northern sector.

8. Significant changes which have taken place during the last year in the organization and management structures of the overall safety management organization will be described, and the effect of the changes will be assessed.

9. Significant changes, for which there are firm plans, in the organization and management structures of the overall safety management organization will be described; and the effect of the changes will be assessed.

The regulation of Eastern Canada offshore exploration safety will include all activities which relate to Eastern Canada exploratory drilling. These include drilling activities, marine activities, and air and sea support functions.

STUDY TOPIC: 2.4 - Regulatory Skills

CONTRACTOR: National Petroleum and Marine Consultants Limited, St. John's, NF
Contact: Dr. W. Russell

COMMISSION STUDY TEAM REPRESENTATIVE: R.G.Dyck
Phone: (709) 772-4319

STATUS: A draft final report is expected November 21, 1983.

STATEMENT OF WORK:

Study Objective

To assess critically the skills required by and the skills present in regulatory groups in relation to the safety of Eastern Canada offshore exploration drilling.

Study Scope

This study will be concerned with the skills required and the skills present in personnel who have responsibility for the formulation, monitoring, and enforcement of regulations and directives in relation to the safety of personnel engaged in Eastern Canada offshore exploratory drilling.

The study will encompass both marine and industrial safety and will be concerned with regulatory groups whose performance impacts upon operational procedures, equipment, and other safety-related matters.

Definitions

Marine Safety - will encompass those aspects of safety which pertain to the preservation of life and the prevention of marine-related, life-threatening incidents in a marine environment. As such, marine safety will include, but will not be limited to, evacuation equipment and procedures, survival equipment and procedures, and marine-related operational equipment and procedures on MODUs.

Industrial Safety - for the purposes of this study, will encompass those aspects of safety directly related to the safety of all personnel on a drilling unit. As such, items such as firefighting and well-control equipment and procedures which affect all personnel will be included; but items such as safety clothing and electrical equipment which would not affect the safety of all personnel would be excluded.

Task Description

1. The contractor will identify the groups within the Federal and Provincial regulatory structures which have direct responsibility for the various facets of industrial and marine safety. These responsibilities will include the responsibilities for the formulation, monitoring, granting of exceptions to, and enforcement of regulations and directives, as well as the responsibility for safety-related inspections of equipment and procedures.

2. The specific skills necessary to formulate, monitor, enforce, and grant exceptions to regulations and directives will be determined for each facet of industrial and marine safety. These skills may include but are not limited to:

- A working knowledge of various pieces of equipment.
- Special formal training.
- Hands-on experience.

3. In addition to the specialist skills necessary for each facet of industrial and marine safety, the contractor will prepare a general description of the capabilities required by the various levels in the regulatory administration regardless of the technical area of responsibility.

4. The skills possessed by each of the groups responsible for the various facets of marine and industrial safety will be identified and evaluated relative to the specific skills necessary to effectively formulate, monitor, enforce, and grant exceptions to regulations and directives in that area. Particular attention will be paid to personnel involved in the inspection of equipment and procedures with the intent of granting approvals or enforcing of regulations.

5. The capabilities of the personnel in the various levels in the regulatory administration will be identified and evaluated relative to the required capabilities which were developed in task #3.

6. Conclusions will be drawn as to the levels of skills and capabilities present in the various regulatory groups and as to how the present levels of skills could adversely affect the safety of Eastern Canada offshore exploratory drilling.

STUDY TOPIC: 2.5 - Industry Mangement of Regulations

CONTRACTOR:

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A contract will be issued to Continental Drilling Management, Calgary. The final report is due January 31, 1984.

STATEMENT OF WORK:

Study Objective

To assess critically the method used and the degree to which operators and drilling contractors regulate the safety of Eastern Canada offshore drilling operations.

Study Scope

In addition to government imposed safety-related regulations, the operators and drilling contractors currently active on the Eastern Canada offshore have internal safety-related policies and operating requirements. The study will compare the policies and operating procedures of these companies to the government regulations.

The study will investigate the method whereby the operator ensures that the drilling contractor and other contractors comply to government safety regulations and to the operator's safety standards.

The method by which the drilling contractor ensures that all personnel on the drilling unit comply with government safety regulations and the drilling contractor's safety standards will be investigated.

The points of contact between the regulatory agencies and the operators and drilling contractors for the transmittal of safety-related requests, proposals, or regulatory requirements will be determined. The points of contact between the operator and the individual contractors for the transmittal of regulatory and operator safety requirements will also be determined.

Task Description

1. A list of all of the operator/drilling contractor combinations which operated in the Eastern Canada offshore in 1982/83 will be compiled. This list will form the basis of the study data but will not include the Mobil Oil/ODECO combination.

2. The company policies and operating requirements for each of the operators and each of the drilling contractors which relate to safety will be outlined and compared to the relevant government safety regulations which are in place.

The areas of safety which will be addressed are:

a. Well control:

This will include the well control equipment and procedures as well as the required formal training in well control. Requirements for drills, pressure tests, etc., will also be included.

b. Life-saving equipment and procedures:

This will include both marine and industrial life-saving equipment. The marine life-saving equipment will include the equipment which is required to facilitate survival in a marine environment following the loss of a helicopter, supply vessel, or drilling unit. Industrial life-saving equipment will include equipment which is required on drilling units such as fire extinquishers, gas masks, medical facilities, etc., for the on-board safety of personnel.

The marine and industrial life-saving procedures will include inspections, drills, etc., and will be concerned with the quantity and quality of such.

c. Marine emergency training:

This will include the training required of personnel to deal with a marine incident such as a helicopter crash, loss of a drilling unit, or loss of a supply vessel. It will deal only with the marine aspects of the training which is required to facilitate self survival or to facilitate the rescue of others.

d. Marine Procedures:

This will include the procedures and standards relative to the marine safety of MODUs. It will include standards and procedures relative to marine staffing levels, navigation, stability, positioning, avoidance of collision, and other factors which may affect the safety of the drilling unit.

3. The areas in which each of the operator's or drilling contractor's policies and operating requirements differ from the government regulations will be noted, and an assessment will be made as to their effectiveness relative to the effectiveness of the government regulations.

4. An assessment will be made of the overall effectiveness of the combined government and industry safety regime. This assessment will highlight areas of inadequacy, areas of conflicts, etc.

5. The method by which each of the operators ensures that the drilling contractor and all other contractors comply with government safety regulations and with the operator's safety policies or operational requirements will be documented. This method may be in the form of contract terms, verbal instructions, written instructions, or by some other means.

6. Similarly, the method by which each of the drilling contractors ensures that all on-board personnel comply with government safety policies or operational requirements will be documented.

7. The points of contact in the operator's organization which are responsible for the transmitting of government safety regulations and the operator's safety standards to the drilling contractor and to other contractors will be determined. The points in the operator's organization which ensure that these regulations and standards are met will also be determined.

8. Similarly, the points of contact in the drilling contractor's organization which are responsible for the transmitting of government safety regulations and of the drilling contractor's safety standards to all on-board personnel will be determined. The points in the drilling contractor's organization which ensure that these regulations and standards are met will also be determined.

9. The points of contact in the operator's and drilling contractor's organizations which are responsible for the reception of safety-related requests, proposals, or requirements from the regulatory agencies will be determined.

10. The points of contact between the operator and the regulatory agency and between the operator and the contractor may be different. The method whereby the points of contact interact internally will be determined.

11. A critical assessment will be made on each of the operators and drilling contractors as to the effectiveness of the organizations in ensuring that both government safety regulations and the operator's and drilling contractor's safety standards are met in a prompt and efficient manner.

3.0 DESIGN

This study area addresses the process of conception, design, construction, classification, and certification of structures and equipment used in offshore drilling operations. It will include consideration of operational limitations and upkeep reqirements.

STUDY TOPIC: 3.1 - Rig Design Stability and Integrity Criteria

CONTRACTOR: Mr. Gary Purcell, St. John's, NF

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A small contract has been let to Mr. Gary Purcell to update a table comparing different agency criteria. The product was submitted and accepted by the Commission.

STUDY TOPIC: 3.2 - Critical Systems

CONTRACTOR:

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: A Request for Proposal was sent to a selected list of bidders, and proposals are expected to be received by November 4, 1983.

STATEMENT OF WORK:

Study Objective

To develop general principles that should be applied in the design, control, and performance monitoring of systems critical to the safe operation of Mobile Offshore Drilling Units (MODUs).

To appraise critically the design, operation and performance monitoring of systems critical to the safe operation of MODUs.

Study Scope

The study will identify and describe the systems on semisubmersible, jack-up, and ship-shape drilling units upon which the safe operation and intact survival of the MODU depends.

The study will develop (and illustrate with examples) the general design principles that should be applied in the design of each of the critical systems, the subsystems that control their operation where applicable, and the related inspection, status sensing, data processing, monitoring, and display systems.

Some of these principles will be general in nature and have relevant application in all systems. Other principles may be system specific but should be formulated to apply generally to any specific design of the critical system.

Definitions

Mobile Offshore Drilling Unit - for the purpose of this study refers to semisubmersibles, jack ups and drillships.

Critical Systems - refers to systems whose failure to function totally or in part could lead to the loss of the drilling unit or endanger the lives of those on the unit in credible adverse circumstances.

Control - those subsystems incorporated in active critical systems that control their operation. These subsystems may be automatic or depend in varying degrees on operator intervention.

Monitoring - refers to the subsystems or procedures in place to determine the status of systems. These may involve visual or other types of physical inspections and/or sensing devices designed to determine the status of system elements. It includes the means by which the data so sensed is processed, is used for control purposes, and is displayed for operator and management use.

Task Description

1. a. The systems in place on a semisubmersible, jack-up, or ship-shape drilling unit which are critical to the safety of the unit will be indentified and described.

For semisubmersibles, the critical systems that may merit examination include, but are not limited to:

- structural systems
- ballast stability systems
- station keeping systems
- power systems

For jack-up rigs, the systems might include:

- transiting systems
- foundation/footing structural systems
- jacking systems

For ship-shape vessels, they might include:

- station keeping
- power systems

For all types of MODUs:

- well control systems
- fire detection and control systems
- in-service performance monitoring and surveillance

The following systems will not be examined as they are being addressed by other studies:

- evacuation and/or emergency response systems
- communication systems
- weather/ice hazard detection and prediction systems

b. The function and performance requirements/capabilities of each system will be described.

c. General design principles will be developed that address the requirements and performance of critical systems, their monitoring and control, with the objective of minimizing the risk of catastrophic loss or life-threatening events. Such principles may include but are not limited to:

- systematic redundancy
- safety factors
- fail-safe concepts
- maintenance of control
- reliability, accessability, and maintainability
- user compatability

2. Utilizing statistical and other information on the causes of MODU system failures or rig losses, a small selected number of critical systems with which the greatest risk of loss may be associated will be identified. This selection process will require consultation with the client. The guidelines, codes, and regulations which govern their design, monitoring, and control for use in the Canadian offshore will be critically examined. Instances where the principles developed in task 1 above, if incorporated in the guidelines, codes, or regulations, would address significant deficiencies or materially improve the performance of the regulatory functions will be described.

STUDY TOPIC: 3.3 - Rig Design Evolution

CONTRACTOR:

COMMISSION STUDY TEAM REPRESENTATIVE: S.E. Cooper
Phone: (709) 772-4319

STATUS: A contract will be placed with Earl and Wright. The final report is due December 15, 1983.

STATEMENT OF WORK:

Study Objective

To trace the technological advancements on offshore drilling rigs and related systems; to provide an historical perspective of changes in design concepts and their effect on safety.

Task Description and Scope

As the area of concern to the Commission is limited to the Eastern Canada offshore, only the design of jack-ups, semisubmersibles, and drillships should be considered. It is envisioned that the early stages of offshore drilling rig design will be a straight-forward narrative. The detail should concentrate on the development of rig systems that came about in order to accommodate increasingly rigorous operating criteria.

Task 1 - provide a general historical description of overall rig ment activities and describe in which direction the rig design industry appears to be headed. Identify and provide a brief introduction to each of the major rig systems (eg. structural configuration, ballast control, mooring, etc.) as they appeared chronologically. Avoid drilling systems except where offshore requirements demanded deviance from accepted onshore practice.

Task 2 - detail the development of each of the systems identified in Task 1. Emphasis should be placed on technological advancements as they relate to specific discoveries, incidents, regulations, and operating constraints.

Task 3 - assess the rig designers' ability to adapt to changes in requirements and operating criteria. Identify the basis upon which changes are made (operating, experience, failures, simulations, etc.). Reference should be made to current damage statistics in order to show if indeed the changes have been effective.

STUDY TOPIC: 3.4 - Risk

CONTRACTOR:

COMMISSION STUDY TEAM REPRESENTATIVE: S.E.Cooper
Phone: (709) 772-4319

STATUS: Discussions on scope and approach to this study are being held. A paper on the subject has been drafted by E. Siddall to aid in discussions.

STATEMENT OF WORK:

Study Objective

To assess the risk involved with Eastern Canada offshore exploratory drilling operations as it relates to human safety.

Study Scope

Risk is defined as the probability of an adverse event. For the purpose of this study risk will be confined to pertain to only those events which result in fatality or disability.

The geographic area of concern is shown in Figure 1. Exploratory drilling operations includes semisubmersibles, jack-ups and drillships and is meant to contain all support operations (i.e. supply vessels, helicopter, etc.).

Task Description

1. Identify the hazardous events that could result in fatality or disability and rank by relative risk. Only accident statistics for Eastern Canada operations should be used. Examples of hazardous events would be: blowout, rig capsize, fire, etc.

From this an overall probability of fatality or disability associated with Eastern Canada offshore drilling operations should be derived.

2. Following the model used above the risk of exploratory drilling operations in other areas of the world (i.e. Gulf of Mexico, North Sea, etc.) would be derived and used to compare with the Eastern Canadian experience. This will provide a framework of relative risk.

3. Carrying this idea of relative risk further, the same methods should be used to compare Eastern Canada exploratory drilling operations with other energy industries, such as onshore (land based) drilling for oil and/or gas, atomic energy generation, and coal mining and production.

4. A further comparison could be made within the offshore drilling operation itself to the relative risk of:

i. different occupations in drilling and support operations;
ii. different geographical regions within the bounds of the study area.

5. A general cost benefit analysis is required to put into perspective the amount of money being allocated to the particular hazards indentified in Task 1 and to assess the ability and willingness of the petroleum industry to set priorities when the issue is human safety.

4.0 SAFETY

This study area focuses on elements of offshore drilling operations directly related to establishment and maintenance of personnel safety. It includes the identification of levels of risk for various activities. It deals with workplace health and safety. In particular it will address systems to ensure survival and minimize injury resulting from unplanned events. Special focus will be given to systems of evacuation, survival and recovery, including self help as well as external assistance.

STUDY TOPIC: 4.1 - Occupational Health and Safety

CONTRACTOR: Memorial University of Nfld., St. John's, NF
Contact: Dr. M. House

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: Executive summary and final report are due October 31, 1983.

STUDY TOPIC: 4.2 - Rescue

CONTRACTOR: Study Team consisting of J.A. Fulton, I. Green, and J. Dardier

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: Stage I report was submitted October 7, 1983. A Stage II report is scheduled for completion December __, 1983.

STATEMENT OF WORK:

Study Objectives

To assess critically rescue capability in relation to Eastern Canada Offshore exploratory drilling operations.

Definitions

Rescue capability - refers to government Search and Rescue as well as self-help capability.

Eastern Canada Offshore - extends from the Canada-US offshore boundary north to approximately 75°N. Its seaward extent is defined as the limit for exploration activities that are under Canadian control (figure attached).

Exploratory drilling operations - includes marine and drilling aspects of exploration and delineation drilling. It includes marine and air support operations.

Study Scope

This study will examine the capability to deal with an emergency incident (unplanned event) which involves evacuation of personnel. It will emphasize incidents associated with the drilling unit but will include events related to support vessels and transport helicopters.

The study will assess rescue needs in view of current and known future exploratory operations. It will determine the extent to which acceptable rescue capabilities are currently provided by government and industry. It will identify any "gaps" in capability and consider means for filling these gaps.

Task Description

1. Stage One - Scope Reveiw

Initially, the contractor will undertake a review of available literature and ongoing research and development activities. This will enable an evaluation of the extent to which other efforts are addressing the study topic.

The available current literature includes:

- the "Cross" Report
- the Department of National Defence Reports on Search and Rescue Response in the Halifax Search and Rescue Region.
- SAR Helicopter Posture Study
- SAR Fixed Wing Posture Study
- DND Major Marine Disaster Plan

A description of present rescue capabilities (government and industry) will be provided with emphasis on any plans for change and any "gaps" in capabilities and coverage. One means of providing this description will be a review of statistics on "risk incidents" to evaluate their applicability as the basis for allocation of government rescue resources.

The contractor will undertake a scope review and make recommendations on Stage Two work scope and schedule.

2. Stage Two - Assessment

At this time and subject to recommendations made following Stage One, the following are seen as needing to be addressed in detail:

a. The contingency plans of industry and government as applicable to a rescue operation will be reviewed. This work will include an evaluation of past rescue incidents to compare actual performance versus written plans and procedures. The essentials of a coordinated contingency plan will be identified, with emphasis on command structure.

b. The technology available to provide continuous monitoring of the situation and effective communication related to it will be briefly reviewed. The equipment now in operation will be evaluated to determine the extent to which necessary monitoring is provided and adequate communication links are in place to achieve effective response. Most important, however, will be an evaluation of the means to ensure that information is communicated in an accurate and timely manner to direct effective response. A review of existing emergency communications (content and procedures) will be undertaken to identify possible improvements.

c. The industry and government capabilities will be critically examined to determine the extent to which they complement each other.

In particular, the role in rescue and required capabilities of stand-by (or rescue) vessels and transport helicopters in rescue will be considered. The special training and equipment requirements related to rescue will be evaluated, and this evaluation will include a discussion of the practicability of integrating this capability with normal service operations.

d. The government SAR capability will be critically examined in terms of deployment (distribution) of resources, the quantity and quality of these resources, and their suitability (preparedness, capibility) to respond to a major offshore incident. "Levels of Service Standards" will be compared with known information on survivability to determine the extent to which "gaps" exist in rescue capability.

e. The applicability of state of the art technology to search operations will be reviewed. This will include an evaluation of devices such as Emergency Locator Transmitters and the use of the SARSAT (Search and Rescue Satellite Aided Tracking) system.

f. Systems to recover personnel or survival craft will evaluated to identify capability, applicability, and limitations. Requirements to ensure compatibility between recovery systems and survival equipment will be identified.

g. Rescue systems in other jurisdictions (eq. North Sea) will be examined and compared with the Canadian equivalent.

h. Conclusions will be drawn regarding measures to improve rescue capability.

i. Specific study needs will be identified.

STUDY TOPIC: 4.3 - Escape and Survival

CONTRACTOR: Hollobone, Hibbert & Associates Ltd., London, U.K.
Contact: Mr. Jeremey Daniels

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A draft final report is scheduled for completion February 15, 1984.

STATEMENT OF WORK:

Study Objective

To assess critically the means for escape and survival following an emergency incident associated with Eastern Canada offshore exploratory drilling operations.

To provide a perspective on practical possibilities to improve these means.

Study Scope

This study will be principally concerned with semi-submersible drilling units but will also consider jack-up rigs, drillships, and helicopters and supply vessels. For purposes of this study, it is assumed that the emergency incident has resulted in a requirement to evacuate from the rig, supply boat, or helicopter. Such an incident could include blowout, fire, explosion, collision, capsize, structural failure, helicopter crash, or helicopter ditching.

Escape refers to systems to enable safe emergency evacuation of the rig, vessel, or helicopter.

Means for survival refers to systems to ensure maintenance of human lives under hostile conditions while awaiting rescue. Such means include life boats, life rafts, immersion and survival suits, and personal flotation devices.

Systems refers to materials, equipment, and contingency plans related to escape, survival, and related location and recovery.

Task Description

1. Factors present in the study area which affect the ability to safely evacuate a drilling unit, helicopter, or supply vessel will be identified. These could include the type of incident, sea state, weather conditions, etc.

2. Factors present in the study area which affect the ability to survive after having evacuated a drilling unit, helicopter, or supply vessel will be identified. These could include type of incident, sea state, weather conditions, water temperature, etc.

3. It is assumed that a major factor in the ability to safely evacuate and to survive after evacuation is the environmental conditions at the time of the incident. The study area encompasses a large geogaphical area; and as a result, the environmental conditions which affect the ability to escape and survive vary widely throughout the geographical area. Similarly, the factors which affect the ability to escape and survive vary greatly for each area dependent upon the time of year.

The contractor will identify "blocks" both geographically and by the time of year where factors which affect the ability to escape and survive are similar.

For example, Block #1 may be the Hibernia area from May to September, Block #2 may be the Hibernia area from October to March, but other areas far removed from the Hibernia area may fit into Block #1 or Block #2 at various times of the year.

The environmental data required to construct these blocks will be supplied by the studies being carried out on environmental conditions for the Royal Commission on the Ocean Ranger Marine Disaster.

In extracting the environmental data from the studies and in constructing the factor blocks, the data used will be the predicted extremes for each of the identified blocks.

4. Criteria will be developed for each block which outlines the required capabilities of evacuation systems in order to safely evaluate a drilling unit, helicopter, or supply vessel.

5. Criteria will be developed for each block which outlines the required capabilities of survival systems in order to survive after the evacuation of a drilling unit, helicopter, or supply vessel.

6. The contractor will review available literature which has assessed the capabilities of current systems designed to facilitate the safe emergency evacuation from a rig, vessel, or helicopter and literature which has assessed the capabilities of current means for survival.

This literature includes but is not limited to:

: "Evaluation of Emergency Equipment and Sea Rescue Techniques for Use From Mobile Offshore Drilling Units in Canadian Waters" prepared by Martec Ltd. for the Canadian Oil and Gas Lands Administration.

: "Report of the EPOA/APOA Offshore Safety Task Force" to the EPOA/APOA Safety Committee.

: "Survival Equipment for Offshore Installations" prepared for the UK Offshore Operators Association Limited.

: "The Safe Evacuation of Men During Emergency Abandonment of Offshore Oil and Gas Installations--Survival While Awaiting Rescue" by J. H. Cross and J. M. Feather, Offshore Survival Center, Robert Gordon's Institute of Technology.

: "Survival Suits for Accidental Immersion in Cold Water: Design Concepts and Their Thermal Protection Performance" The University of Victoria, Victoria, BC (1978).

: Wright, C. H., Survival at Sea, The Lifeboat and Liferaft, The James Laver Printing Co. Limited, Liverpool 1977.

: Norges Skipsforskningsinstitutt, The Ship Research Institute of Norway. Project Report, "SSB 2.2 Project Free Fall Lifeboats for Offshore Production Platforms", Part 1 & 2, November 1982.

: A study currently underway on the means for escape and survival by the UK Offshore Operators Association Limited.

7. From the information contained in this literature the contractor will identify the evacuation systems currently available which meet or exceed the criteria developed in step No. 4 for each block.

8. From the information contained in the literature, the contractor will identify the survival systems currently available which meet or exceed the criteria developed in step No. 5 for each block.

9. In the case of blocks where existing evacuation systems do not meet the developed criteria, an assessment will be made as to the frequency of occurrence of the factors upon which these criteria are based. For example, if the criteria were based upon a major storm condition, the expected frequency of that condition will be identified.

10. In the case of blocks where existing survival systems do not meet the developed criteria, an assessment will be made as to the frequency of occurrence of the factors upon which these criteria are based.

11. From the literature, the contractor will identify proposed evacuation systems and evacuation systems currently under development which, if successfully developed, would meet or exceed the criteria for the blocks where existing systems cannot meet the criteria.

12. From the literature, the contractor will identify proposed survival systems and survival systems currently under development which, if successfully developed, would meet or exceed the criteria for the blocks where existing systems cannot meet the criteria.

13. The contractor will provide an overall summary of the above tasks which outlines the overall escape and survival capability in the study area. This summary could be in the form of maps of the study area for various times of the year which outline areas where there are existing gaps in escape and survival capability.

STUDY TOPIC: 4.4 - Normal and Emergency Command Structures

CONTRACTOR: Currie, Coopers & Lybrand, Calgary, AB
Contact: Mr. David E. Smith

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A contract has been placed with Currie, Coopers & Lybrand. The final report is due January 31, 1984.

STATEMENT OF WORK:

Study Objective

To assess critically, the normal and emergency command structure, and their functioning, of "drilling systems" in relation to Eastern Canada offshore exploratory drilling operations.

Definitions

"Drilling System" - refers to a drilling unit and the support facilities such as support vessels, transport helicopters, and shore bases assigned to that particular drilling unit.

Chain of Command - refers to the command structure and related responsibilities and authorities of the various levels within the command structure.

Information Flowpaths - refers to the verbal and written flow of information within the command structure and between the command structure and external contacts.

Study Scope

The study will be concerned with the normal command structures of "drilling systems" and the emergency command structures for dealing with: a major fire on a drilling unit, the loss of a support craft (vessel or helicopter), the loss or disablement of a drilling unit, and the loss of well control. It will examine the influences of government regulations on command structures.

An evaluation of planned and actual emergency command structures will be made; and criteria will be developed for effective emergency command structures.

The emergency command structures currently planned in the Eastern Canada offshore will be evaluated to determine their effectiveness.

Task Description

1. The contractor will compile a list of all "drilling sytems" which have been used in the study area from 1975 to the present.

2. The normal command structure for each "drilling system" will be documented. This documentation will include the internal command structure within specific units of the "drilling system" as well as the normal command structure for the "drilling system" in its entirety.

This description will include the relationships within the command structure of all of the groups involved in the "drilling system". These will include the oil company, drilling contractor, marine support, air support, and subcontractor personnel.

3. The normal command structures investigated will be grouped into a small number of like normal command structures which show the basic normal command structures which have been used.

4. Government guidelines and regulations dealing with normal and emergency command structures will be described and evaluated.

5. Describe all incidents in the Eastern Canada offshore where the normal command structure has been converted to an emergency command structure. This will include all actual or apprehended circumstances involving a major fire on a drilling unit, the loss of a support vessel, the loss of a helicopter, the loss or disablement of a drilling unit, or the loss of well control.

6. The incidents where there has been a change from the normal command structure to the emergency command structure will be analysed. A comparison of the planned emergency command structure and its functioning and the actual emergency command structure which evolved and its functioning will be made.

Reasons for differences between the actual and planned emergency command structures and their functioning will be documented, and an assessment will be made as to their effects. The incident involving the loss of the Ocean Ranger will be excluded from this analysis.

7. An analysis of actual incidents which involved a major fire on a drilling unit, the loss of a support vessel, the loss of a helicopter, the loss or disablement of a drilling unit, and the loss of well control will be undertaken. A minimum of two examples of each type of incident will be examined; and if possible, the incidents will be from the Eastern Canada offshore region. If the data for the incident is not available from the Eastern Canada offshore, incidents which have occurred elsewhere will be analysed with preference being given to incidents which have occurred in the North Sea or in the USA.

The analysis will consist of a comparison of the planned emergency command structure and its functioning and the actual command structure which developed during the incident and its functioning.

Differences between the planned and actual structure and its functioning will be assessed and the reasons for these differences will be documented.

8. In the case where incidents from elsewhere in the world are analysed, the normal command structure for the "drilling system" will be documented; and the effects of government regulations on both the normal and emergency command structures will be assessed.

9. From the analysis of actual incidents, criteria will be developed for effecive emergency command structures for each type of incident.

10. The planned emergency command structures for each type of incident which have been formulated for current Eastern Canada offshore drilling programs will be evaluated against the developed criteria, and an assessment will be made of their effectiveness.

11. The effects that the requirements of an effective emergency command structure may have on the normal command structure will be discussed.

STUDY TOPIC: 4.5 - Communications Systems

CONTRACTOR: Nordco Limited
Contact: R.W. Crocker, Project Manager

COMMISSION STUDY TEAM REPRESENTATIVE: R.G. Dyck
Phone: (709) 772-4319

STATUS: A contract has been placed with Nordco Limited. The final report is due January 31, 1984.

STATEMENT OF WORK:

Study Objective

To assess critically the means for communication in relation to safe operation of Eastern Canada offshore exploratory drilling and to provide a perspective on practical possibilities to improve these means should they be found to be deficient.

Definitions

Drilling System - refers to a drilling unit and the support facilities such as support vessels, transport helicopters, and shore bases assigned to that particular drilling unit.

Means of Communication - refers to the communications hardware used to transmit information from place to place by verbal, written, or other means.

Study Scope

This study will examine the communications systems currently in use for Eastern Canada offshore drilling units, support vessels, transport helicopters, and at shore support bases. Both internal and external communications systems will be examined; and an assessment will be made of their adequacy to ensure safe operations in terms of information transmittal capability, reliability, ease of use, physical location of the equipment, compatability of the systems, and special training required for use.

An evaluation will be made of the reliability of communications systems to ensure their proper operation during an emergency event, including a condition involving a partial or total failure of a communication system. The conditions which could lead to the failure of the individual communications systems will be examined and documented.

The study will examine communications systems in use in the offshore drilling industry and in other offshore industries in other areas of the world as well as systems which are being developed to determine their applicability and effectiveness in the Eastern Canada offshore.

Task Description

The contractor will undertake a review of the communications systems currently in use in Eastern Canada offshore exploratory drilling.

The internal communications system of drilling units presently in use and the external communications systems of drilling units, support vessels, transport helicopters and shore bases will be examined; and a description of these communications systems will be provided.

The described communications systems will be evaluated, and an assessment will be made of their individual suitability in terms of:

1. the required quality and quantity of transmissions
2. reliability
3. ease of use
4. physical location of the equipment
5. compatability with other systems
6. training required to operate.

The total communications network associated with each "drilling system" (drilling unit, support vessels, transport helicopters, shore bases) will be examined; and an assessment will be made as to the effectiveness of the system in maintaining communications links between each component. The degree of redundancy inherent in the communications system will be identified; and an assessment will be made as to the conditions which could occur which would lead to a loss of communications between various components (ie. drilling unit and support vessel, shore base and support vessel, shore base and drilling unit, etc.).

Communications systems currently in use in the offshore drilling industry and in other offshore industries in other areas of the world will also be examined and evaluated using the same criteria as was used in the evaluation of systems currently in use in the Eastern Canada offshore. Systems currently being developed will also be examined and evaluated using these criteria.

An assessment will be made on the combination of the individual systems currently in use or under development which would provide the most "desirable" overall communications system for a "drilling system" in terms of information transmission, reliability, ease of use, physical location of equipment, compatability with other systems, and required training.

5.0 TRAINING

To evaluate and, as appropriate, recommend improvements to operational marine and safety training for Eastern Canadian offshore petroleum industry and related sectors.

STUDY TOPIC:	5.1 - Marine and Safety Training
CONTRACTOR:	College of Fisheries, Marine Navigation & Engineering, St. John's, NF Contact: Dr. R. Barrett
COMMISSION STUDY TEAM REPRESENTATIVE:	R.G. Dyck Phone: (709) 772-4319
STATUS:	The contractor submitted a preliminary draft on July 18, 1983. An internal review has been completed and further work has been identified. The draft final report is now scheduled for December 15, 1983.